Exelon Generation®

10CFR50.73

LG-14-071
May 5, 2014

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Unit 1
Facility Operating License No. NPF-39
NRC Docket No. 50-352

Subject: LER 2014-004-00, Valid Manual Actuation of the Reactor Protection System With the Reactor Critical Due to Closure of Main Turbine Intercept Valves

This Licensee Event Report (LER) addresses a valid manual actuation of the reactor protection system when the reactor was critical. The event was due to a closure of the main turbine intercept valves. The valves closed due to a degraded Electro-hydraulic Control (EHC) system power supply.

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

There are no commitments contained in this letter.

If you have any questions, please contact Robert B. Dickinson at (610) 718-3400.

Respectfully,

Original signed by David P. Lewis for

Thomas J. Dougherty
Vice President – Limerick
Exelon Generation Company, LLC

cc: Administrator Region I, USNRC
USNRC Senior Resident Inspector, LGS

NRC FORM 366 (01-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

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4. TITLE

Valid Manual Actuation of the Reactor Protection System With the Reactor Critical Due to Closure of Turbine Valves

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
03	04	2014	2014	- 004 -	00	05	05	2014	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Robert B. Dickinson, Manager – Regulatory Assurance	610-718-3400

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	IT	JX	L045	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

A valid manual actuation of the reactor protection system (RPS) was initiated due to an unexpected closure of all six main turbine intercept valves (IVs). The cause of the main turbine IVs closure was due to a degraded Electro-hydraulic Control (EHC) 30 VDC house power supply. The Unit 1 EHC system was replaced with a Digital EHC (DEHC) system during the subsequent refueling outage 1R15. The Unit 2 EHC system is scheduled to be replaced with a DEHC system during the next refueling outage 2R13 in April 2015. The Unit 2 EHC house and permanent magnet generator (PMG) power supplies as-found voltages were verified to be within the calibration procedure limits and the as-left voltages were adjusted to the middle of the procedure acceptable band during the planned maintenance outage 2M49.

NARRATIVE

Unit Conditions Prior to the Event

Unit 1 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no other structures, systems or components out of service that contributed to this event.

Description of the Event

On Tuesday, March 4, 2014, Limerick Unit 1 was operating in end-of-cycle coast-down at approximately 100% power. At 2334 hours, a valid manual actuation of the reactor protection system (RPS) (EIIS:JC) was initiated by the operators as directed by the end of cycle steady state operations procedure (GP-5 Appendix 1) due to an unexpected closure of all six main turbine intercept valves (EIIS:V). The manual RPS actuation was performed to prevent turbine (EIIS:TRB) damage due to potential rapid heating resulting from windage losses in the exhaust hood.

The operators entered the procedure for reactor pressure vessel (RPV) control (T-101) and stabilized reactor parameters. The operators verified that all control rods were fully inserted.

Reactor level initially decreased to a minimum of -4 inches and then increased to a maximum of +35 inches on wide range level instrumentation. The +54 inch high-level turbine trip setpoint was not exceeded. The reactor water level of less than +12.5 inches resulted in an isolation signal to the closed Group IIB valves as expected.

Reactor pressure initially was 1040 psig, increased to 1059 psig, and decreased to approximately 950 psig, then stabilized. Reactor pressure remained less than the lowest safety relief valve (SRV) setpoint of 1170 psig; therefore, no SRVs actuated. The main steam bypass valves opened as designed to control pressure.

The post-scram troubleshooting identified a degraded EHC 30 VDC house power supply.

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A 4-hour NRC ENS notification was required by 10CFR50.72(b)(2)(iv)(B) for an actuation of RPS when the reactor was critical. The ENS notification (#49871) was completed on Wednesday, March 5, 2014, at 0226 EDT. This event involved a manual actuation of RPS. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A).

Analysis of the Event

There was no actual safety consequence associated with this event. The potential safety consequences of this event were minimal. The plant equipment performed as designed during the transient with the following exception. The "A" channel of end-of-cycle recirculation pump trip (EOC-RPT) logic failed to actuate; however, the recirculation pump trip safety function was completed by the "B" channel logic. The logic was restored to operable status during the 1R15 refueling outage. The operators effectively stabilized reactor parameters and verified all control rods were fully inserted.

A main turbine trip transient is discussed in UFSAR section 15.2.3. A turbine trip with bypass is an incident of moderate frequency. The function of the IVs is discussed in UFSAR section 10.2.2.3 Protective Valve Functions. Each low pressure turbine is equipped with two combined intermediate valves (CIVs) which function to protect the turbine against overspeed following a turbine trip.

All six main turbine IVs fast closed due to the degraded EHC power supply which actuated the IV overspeed protection logic. The EHC system uses auctioneered power supplies, but the degraded power supply adversely affected the performance of the partner power supply. This resulted in the IV closures.

The GE MARK 1 EHC control system was replaced by a Westinghouse Ovation Digital Electro-hydraulic Control (DEHC) system during the subsequent refueling outage 1R15 in April 2014. The Unit 2 DEHC modification is scheduled for refueling outage 2R13 in April 2015.

Cause of the Event

The cause of the main turbine IVs closure was due to a degraded EHC 30 VDC house power supply.

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NARRATIVE

Corrective Actions Completed

The Unit 1 EHC system was replaced with a DEHC system during the subsequent refueling outage 1R15.

The Unit 2 EHC house and permanent magnet generator (PMG) power supplies as-found voltages were verified to be within the calibration procedure limits and the as-left voltages were adjusted to the middle of the procedure acceptable band during the planned maintenance outage 2M49.

Corrective Action Planned

The Unit 2 EHC system is scheduled to be replaced with a DEHC system during the next refueling outage 2R13 in April 2015.

Previous Similar Occurrences

There was no previous similar occurrence in the last five years of manual RPS actuation due to main turbine IV closure.

Component data:

System:	IT Main Turbine Instrumentation System
Component:	JX Power Supply, Electric
Component number:	E/S X-M2-11022B
Manufacturer:	L045 Lambda Electronics Div
Model number:	LMF-28-OVMY-3397-3
Serial number:	F73411